

What we claim is:

1. A feeding amount controlling apparatus comprising:  
feeding means for feeding a material;

5 detecting means for detecting feeding rate of the material ;  
first calculating means for calculating a total fed amount  
based on the feeding rate detected by the detecting means;  
stopping means for stopping feeding the material;

second calculating means for calculating a preset amount by  
10 multiplying the feeding rate detected by the detecting means  
and delay time of the stopping means together; and

controlling means for generating the signal for working the  
stopping means when the total fed amount calculated by the first  
calculating means reaches a value defined as the difference  
15 between an intended amount and the preset amount calculated by  
the second calculating means.

2. A feeding amount controlling apparatus as defined in claim  
1, wherein the feeding means comprises feeding rate shifting  
20 mechanism for shifting the feeding rate and the controlling means  
is capable of operating the feeding rate shifting mechanism in  
order to shift the rate from high rate to low one when the total  
fed amount reaches a value defined as the difference between  
the intended amount and an alerting amount.

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3. A feeding amount controlling apparatus as defined in claim  
2, wherein the controlling means is also capable of comparing  
the intended amount to the alerting amount at the start to measure

the feeding amount and of operating the feeding rate shifting mechanism in order to shift the rate from high rate to low one when the intended amount is less than or equal to the alerting amount.

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4. A feeding amount controlling apparatus as defined in claim 2 or 3, wherein the feeding rate shifting mechanism comprises larger diameter valve and smaller diameter valve which are respectively installed in main feeding line and by-pass feeding line thereof and can shift the feeding rate from high rate to low one by closing the large diameter valve.

5. Method for controlling a feeding amount of material comprising steps of :

15 detecting a feeding rate;

calculating a total fed amount based on the detected feeding rate;

shifting the feeding rate from high to low when the total fed amount reaches a value of difference between the intended amount and the alerting amount;

calculating a preset amount based on the detected feeding rate and delay time of stopping means to stop feeding the material; and

generating a signal to work the stopping means when the calculated total fed amount reaches a value of difference between the intended amount and the preset amount.

6. Method for controlling a feeding amount of material



rate;

calculating a preset amount based on the detected feeding rate and delay time of stopping means to stop feeding the material; and

- 5     generating a signal to work the stopping means when the calculated total fed amount reaches a value of difference between the intended amount and the preset amount.

8. Method for controlling a feeding amount of material  
10 comprising steps of :

Determining whether an intended amount is larger than an alerting amount;

opening feeding means to allow the material to be fed at high feeding rate if the intended amount is larger than the alerting  
15 amount ;

detecting a feeding rate;

calculating a total fed amount based on the detected feeding rate;

shifting the feeding rate from high to low when the total  
20 fed amount reaches a value of difference between the intended amount and the alerting amount;

calculating a preset amount based on the detected feeding rate and delay time of a stopping means to stop feeding the material, and a predicted feeding amount based on the detected feeding  
25 rate;

determining whether the intended amount is larger than a summation of calculated total fed amount, the preset amount and the predicted amount;

determining timing that when a signal for working the  
stopping means should be generated based on a remaining amount  
to be fed before generating the signal and the predicted feeding  
amount if the intended amount is less than or equal to the summation  
5 in the previous step.

9. Method for controlling a feeding amount of material  
comprising steps of :

determining whether an intended amount is larger than an  
10 alerting amount;

opening feeding means to allow the material to be fed at low  
feeding rate if the intended amount is less than or equal to  
the alerting amount ;

detecting a feeding rate;  
15 calculating a total fed amount based on the detected feeding  
rate;

calculating a preset amount based on the detected feeding  
rate and delay time of a stopping means to stop feeding the material,  
and a predicted feeding amount based on the detected feeding  
20 rate;

determining whether the intended amount is larger than a  
summation of calculated total fed amount, the preset amount and  
the predicted amount;

determining timing that when a signal for working the  
25 stopping means should be generated based on a remaining amount  
to be fed before generating the signal and the predicted feeding  
amount if the intended amount is less than or equal to the summation  
in the previous step.

10. Method as defined in claims 8 or 9, wherein the step of determining timing is made by calculating  $\Delta t$  according to the following equation:  $\Delta t = (A - PV - V_{pr}) / V_r$ , wherein A is the intended amount, PV is the total fed amount,  $V_{pr}$  is the preset amount and  $V_r$  is the predicted feeding amount.

11. Method as defined in claims 10, wherein the steps until the step of determining whether the intended amount is larger than a summation of calculated total fed amount, the preset amount and the predicted amount are performed at slow scanning rate and the rest of the steps are performed at fast scanning rate.

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